

SEQUENCE LISTING

<110> Huang, Shi
Chadwick, Robert B.

<120> Methods of Detecting and Treating
Microsatellite-Instability Positive Tumors Using RIZ

<130> P-LJ 5101

<150> US 60/256,582
<151> 2000-12-19

<160> 15

<170> FastSEQ for Windows Version 4.0

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<212> DNA
<213> Rattus SP.

<220>
<221> CDS
<222> (157)...(5274)

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Met His Gln Asn Thr Glu
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tct gtg gca gcc act gag act ctg gct gag gta cct gaa cat gtg ctt 222
Ser Val Ala Ala Thr Glu Thr Leu Ala Glu Val Pro Glu His Val Leu
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Arg Gly Leu Pro Glu Glu Val Arg Leu Phe Pro Ser Ala Val Asp Lys
25 30 35

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Thr Arg Ile Gly Val Trp Ala Thr Lys Pro Ile Leu Lys Gly Lys Lys
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Phe Gly Pro Phe Val Gly Asp Lys Lys Lys Arg Ser Gln Val Arg Asn
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Asn Val Tyr Met Trp Glu Val Tyr Tyr Pro Asn Leu Gly Trp Met Cys

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Ile Asp Ala Thr Asp Pro Glu Lys Gly Asn Trp Leu Arg Tyr Val Asn			
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Trp Ala Cys Ser Gly Glu Glu Gln Asn Leu Phe Pro Leu Glu Ile Asn			
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aga gcc att tac tat aaa acc tta aag cca atc gcg cct ggc gag gag			558
Arg Ala Ile Tyr Tyr Lys Thr Leu Lys Pro Ile Ala Pro Gly Glu Glu			
120	125	130	
ctc ctg gtc tgg tac aat ggg gaa gac aac cct gag ata gca gct gcg			606
Leu Leu Val Trp Tyr Asn Gly Glu Asp Asn Pro Glu Ile Ala Ala Ala			
135	140	145	150
att gag gaa gag cga gcc agc gcc cgg agc aag cgg agc tcc ccg aag			654
Ile Glu Glu Glu Arg Ala Ser Ala Arg Ser Lys Arg Ser Ser Pro Lys			
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agc cgc aga ggg aag aag aaa tca cac gag aac aaa aac aaa ggc atc			702
Ser Arg Arg Gly Lys Lys Lys Ser His Glu Asn Lys Asn Lys Gly Ile			
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aga acc cac ccc aca cag ctg aag gca agt gag ctg gac tct acc ttt			750
Arg Thr His Pro Thr Gln Leu Lys Ala Ser Glu Leu Asp Ser Thr Phe			
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gca aac atg agg ggc tct gca gaa ggt cca aaa gaa gag gat gag agg			798
Ala Asn Met Arg Gly Ser Ala Glu Gly Pro Lys Glu Glu Asp Glu Arg			
200	205	210	
cct ttg gct tcg gca cct gag cag cca gcc cct ctg ccg gag gtg ggg			846
Pro Leu Ala Ser Ala Pro Glu Gln Pro Ala Pro Leu Pro Glu Val Gly			
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aat caa gat gca gtt cca cag gtg gcc atc cct ctc cct gcc tgc gag			894
Asn Gln Asp Ala Val Pro Gln Val Ala Ile Pro Leu Pro Ala Cys Glu			
235	240	245	
cca cag cca gag gta gat ggg aaa caa gaa gtc aca gac tgt gag gtc			942
Pro Gln Pro Glu Val Asp Gly Lys Gln Glu Val Thr Asp Cys Glu Val			
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Glu Glu Glu Glu Glu Leu Gly Glu Asp Gly Val Glu Glu Ala Asp Met			
280	285	290	

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Pro	Asn	Glu	Ser	Ser	Ala	Lys	Glu	Pro	Glu	Ile	Arg	Cys	Glu	Glu	Lys	
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cca	gaa	gac	tta	tta	gaa	gag	cca	cag	agc	atg	tcg	aat	gaa	gct	cgt	1134
Pro	Glu	Asp	Leu	Leu	Glu	Glu	Pro	Gln	Ser	Met	Ser	Asn	Glu	Ala	Arg	
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gaa	gac	tct	cca	gac	gtg	acc	cct	cct	ccc	cac	act	ccc	aga	gct	aga	1182
Glu	Asp	Ser	Pro	Asp	Val	Thr	Pro	Pro	Pro	His	Thr	Pro	Arg	Ala	Arg	
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gag	gag	gcc	aac	gg	gat	gta	ctt	gag	aca	ttt	atg	ttt	ccg	tgt	cag	1230
Glu	Glu	Ala	Asn	Gly	Asp	Val	Leu	Glu	Thr	Phe	Met	Phe	Pro	Cys	Gln	
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cac	tgt	gaa	aga	aaa	ttt	gca	acg	aag	cag	ggg	cta	gag	cgt	cac	atg	1278
His	Cys	Glu	Arg	Lys	Phe	Ala	Thr	Lys	Gln	Gly	Leu	Glu	Arg	His	Met	
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cac	atc	cac	att	tct	acc	atc	aat	cat	gct	ttc	aag	tgc	aag	tac	tgt	1326
His	Ile	His	Ile	Ser	Thr	Ile	Asn	His	Ala	Phe	Lys	Cys	Lys	Tyr	Cys	
375					380					385					390	
ggg	aaa	cg	ttt	ggc	aca	cag	att	aac	agg	agg	cg	cat	gaa	cg	cg	1374
Gly	Lys	Arg	Phe	Gly	Thr	Gln	Ile	Asn	Arg	Arg	Arg	His	Glu	Arg	Arg	
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cac	gaa	acg	ggg	ttg	aag	aga	aga	ccc	agc	atg	act	tta	cag	tcc	tca	1422
His	Glu	Thr	Gly	Leu	Lys	Arg	Arg	Pro	Ser	Met	Thr	Leu	Gln	Ser	Ser	
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gag	gat	cca	gat	gat	ggc	aag	ggg	gaa	aat	gtt	act	tct	aaa	gat	gag	1470
Glu	Asp	Pro	Asp	Asp	Gly	Lys	Gly	Glu	Asn	Val	Thr	Ser	Lys	Asp	Glu	
		425					430					435				
tca	agt	cca	cct	caa	ctc	ggg	caa	gac	tgt	ttg	ata	ttg	aac	tca	gag	1518
Ser	Ser	Pro	Pro	Gln	Leu	Gly	Gln	Asp	Cys	Leu	Ile	Leu	Asn	Ser	Glu	
	440					445					450					
aaa	acc	tca	cag	gaa	gta	ctg	aat	tca	tct	ttt	gtg	gaa	gaa	aat	gg	1566
Lys	Thr	Ser	Gln	Glu	Val	Leu	Asn	Ser	Ser	Phe	Val	Glu	Glu	Asn	Gly	
455					460					465					470	
gaa	gtt	aaa	gaa	ctt	cat	ccg	tgc	aaa	tac	tgc	aaa	aag	gta	ttt	gga	1614
Glu	Val	Lys	Glu	Leu	His	Pro	Cys	Lys	Tyr	Cys	Lys	Lys	Val	Phe	Gly	
				475					480					485		
act	cac	acc	aat	atg	aga	cga	cat	cag	cgt	aga	gtt	cat	gag	cgc	cac	1662
Thr	His	Thr	Asn	Met	Arg	Arg	His	Gln	Arg	Arg	Val	His	Glu	Arg	His	
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Leu Ile Pro Lys Gly Val Arg Arg Lys Gly Gly Leu Leu Glu Glu Pro	
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cag cca cca gca gag cag gct cca ccc tcc cag aat gtc tat gtc cca	1758
Gln Pro Pro Ala Glu Gln Ala Pro Pro Ser Gln Asn Val Tyr Val Pro	
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Ser Thr Glu Pro Glu Glu Glu Gly Glu Thr Asp Asp Val Tyr Ile Met	
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gac att tct agc aac atc tct gaa aac cta aat tac tat att gac ggt	1854
Asp Ile Ser Ser Asn Ile Ser Glu Asn Leu Asn Tyr Tyr Ile Asp Gly	
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Lys Ile Gln Thr Asn Ser Ser Thr Ser Asn Cys Asp Val Ile Glu Met	
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Glu Ser Asn Ser Ala His Leu Tyr Gly Ile Asp Cys Leu Leu Thr Pro	
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gtg acc gtg gag att act cag aac ata aag agc act cag gtc tct gtg	1998
Val Thr Val Glu Ile Thr Gln Asn Ile Lys Ser Thr Gln Val Ser Val	
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aca gat gat ctt ctc aaa gac tct ccc agc agc aca aat tgt gag tct	2046
Thr Asp Asp Leu Leu Lys Asp Ser Pro Ser Ser Thr Asn Cys Glu Ser	
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Lys Lys Arg Arg Thr Ala Ser Pro Pro Val Leu Pro Lys Ile Lys Thr	
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Glu Thr Glu Ser Asp Ser Thr Ala Pro Ser Cys Ser Leu Ser Leu Pro	
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Leu Ser Ile Ser Thr Ala Glu Val Val Ser Phe His Lys Glu Lys Gly	
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Val Tyr Leu Ser Ser Lys Leu Lys Gln Leu Leu Gln Thr Gln Asp Lys	
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Leu Thr Leu Pro Ala Gly Phe Ser Ala Ala Glu Ile Pro Lys Leu Gly	
695 700 705 710	
ccc gtg tgc gcg tct gct cct gca tcc atg ttg ccc gtg acc tct agt	2334

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cct	gcc	ctt	cga	gac	ttc	ggg	aaa	cca	aat	gat	ggg	aaa	gca	gca	tgg	2430
Pro	Ala	Leu	Arg	Asp	Phe	Gly	Lys	Pro	Asn	Asp	Gly	Lys	Ala	Ala	Trp	
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Thr	Asp	Thr	Val	Leu	Thr	Ser	Lys	Lys	Pro	Lys	Leu	Glu	Ser	Arg	Ser	
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Asp	Ser	Pro	Ala	Trp	Ser	Leu	Ser	Gly	Arg	Asp	Glu	Arg	Glu	Thr	Gly	
775				780						785					790	
agc	cct	cct	tgc	ttt	gat	gaa	tac	aaa	ata	tca	aag	gaa	tgg	gca	gcc	2574
Ser	Pro	Pro	Cys	Phe	Asp	Glu	Tyr	Lys	Ile	Ser	Lys	Glu	Trp	Ala	Ala	
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Ser	Ser	Thr	Phe	Ser	Ser	Val	Cys	Asn	Gln	Gln	Pro	Leu	Asp	Leu	Ser	
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Ser	Gly	Val	Lys	Gln	Lys	Ser	Glu	Gly	Thr	Gly	Lys	Thr	Pro	Val	Pro	
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Trp	Glu	Ser	Val	Leu	Asp	Leu	Ser	Val	His	Lys	Lys	Pro	Cys	Asp	Ser	
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gaa	ggc	aag	gaa	ttc	aaa	gag	aac	cat	ttg	gca	cag	cca	gct	gca	aag	2766
Glu	Gly	Lys	Glu	Phe	Lys	Glu	Asn	His	Leu	Ala	Gln	Pro	Ala	Ala	Lys	
855				860					865						870	
aag	aaa	aaa	cca	acc	acc	tgt	atg	ctt	caa	aag	gtt	ctt	ctc	aat	gag	2814
Lys	Lys	Lys	Pro	Thr	Thr	Cys	Met	Leu	Gln	Lys	Val	Leu	Leu	Asn	Glu	
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tat	aat	ggg	gtt	agc	tta	cct	aca	gaa	acc	aca	cca	gag	gtg	acc	agg	2862
Tyr	Asn	Gly	Val	Ser	Leu	Pro	Thr	Glu	Thr	Thr	Pro	Glu	Val	Thr	Arg	
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Ser	Pro	Ser	Pro	Cys	Lys	Ser	Pro	Asp	Thr	Gln	Pro	Asp	Pro	Glu	Leu	
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Gly	Pro	Asp	Ser	Ser	Cys	Ser	Val	Pro	Thr	Ala	Glu	Ser	Pro	Pro	Glu	

920	925	930	
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Val Val Gly Pro Ser Ser Pro Pro Leu Gln Thr Ala Ser Leu Ser Ser			
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Gly Gln Leu Pro Pro Leu Leu Thr Pro Thr Glu Pro Ser Ser Pro Pro			
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ccc tgc cct cct gtg tta act gtt gcc act cca cca cct ccc ctc ctt			3102
Pro Cys Pro Pro Val Leu Thr Val Ala Thr Pro Pro Pro Pro Leu Leu			
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cca acc gtc cct ctc tcc cac ccc tct tct gat gcc tcc cct cag cag			3150
Pro Thr Val Pro Leu Ser His Pro Ser Ser Asp Ala Ser Pro Gln Gln			
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Cys Pro Ser Pro Phe Ser Asn Thr Thr Ala Gln Ser Pro Leu Pro Ile			
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ctc tcc cca aca gtg tct ccc tct ccc tct ccc att cct cct gta gag			3246
Leu Ser Pro Thr Val Ser Pro Ser Pro Ser Pro Ile Pro Pro Val Glu			
1015	1020	1025	1030
cca ctt atg tct gct gct tcc cct ggt ccc cca aca ctt tct tcc tcc			3294
Pro Leu Met Ser Ala Ala Ser Pro Gly Pro Pro Thr Leu Ser Ser Ser			
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Ser Ser Ser Ser Ser Ser Phe Pro Ser Ser Ser Cys Ser Ser Thr Ser			
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Pro Ser Pro Pro Pro Leu Ser Ala Val Ser Ser Val Val Ser Ser Gly			
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Asp Asn Leu Glu Ala Ser Leu Pro Ala Val Thr Phe Lys Gln Glu Glu			
1080	1085	1090	
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Ser Glu Ser Glu Gly Leu Lys Pro Lys Glu Glu Ala Pro Pro Ala Gly			
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gga cag agt gtg gtc caa gaa aca ttc agc aaa aac ttc att tgc aat			3534
Gly Gln Ser Val Val Gln Glu Thr Phe Ser Lys Asn Phe Ile Cys Asn			
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gtc tgt gaa tcg cct ttt ctt tcc att aaa gac cta acc aaa cat tta			3582
Val Cys Glu Ser Pro Phe Leu Ser Ile Lys Asp Leu Thr Lys His Leu			
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Ser Val His Ala Glu Glu Trp Pro Phe Lys Cys Glu Phe Cys Val Gln	
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ctg ttt aag gtt aag act gat cta tca gag cat cga ttt ctg ctt cat	3678
Leu Phe Lys Val Lys Thr Asp Leu Ser Glu His Arg Phe Leu Leu His	
1160 1165 1170	
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Gly Val Gly Asn Ile Phe Val Cys Ser Val Cys Lys Lys Glu Phe Ala	
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Phe Leu Cys Asn Leu Gln Gln His Gln Arg Asp Leu His Pro Asp Glu	
1195 1200 1205	
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Arg	Tyr	Thr	Pro	Lys	Lys	Asn	Pro	Val	Pro	Leu	Lys	Gln	Thr	Val	Gln	
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Pro	Lys	Asn	Gly	Val	Val	Val	Leu	Asp	Asn	Ser	Gly	Lys	Asn	Ala	Phe	
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Lys	Met	Ser	Pro	Asn	Lys	Leu	Lys	Leu	Ser	Ala	Leu	Lys	Lys	Lys	Asn	
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Gln	Leu	Val	Gln	Lys	Ala	Ile	Leu	Gln	Lys	Asn	Arg	Ala	Ala	Lys	Gln	
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aag	gcg	gac	ctg	agg	gat	act	tcc	gag	gcg	tcc	tca	cac	atc	tgc	ccg	4494
Lys	Ala	Asp	Leu	Arg	Asp	Thr	Ser	Glu	Ala	Ser	Ser	His	Ile	Cys	Pro	
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Tyr	Cys	Asp	Arg	Glu	Phe	Thr	Tyr	Ile	Gly	Ser	Leu	Asn	Lys	His	Ala	
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Ala	Phe	Ser	Cys	Pro	Lys	Lys	Pro	Leu	Ser	Pro	Ser	Lys	Arg	Lys	Val	
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Ser	His	Ser	Ser	Lys	Lys	Gly	Gly	His	Ala	Ser	Ser	Ser	Ser	Ser	Asp	
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aga	aac	agc	agc	tgc	cac	ccc	cgg	agg	cgg	act	gca	gat	acc	gag	atc	4686
Arg	Asn	Ser	Ser	Cys	His	Pro	Arg	Arg	Arg	Thr	Ala	Asp	Thr	Glu	Ile	
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aag	atg	cag	agc	acg	cag	gca	ccc	ttg	ggc	aag	acc	aga	gct	cgg	agt	4734
Lys	Met	Gln	Ser	Thr	Gln	Ala	Pro	Leu	Gly	Lys	Thr	Arg	Ala	Arg	Ser	
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aca	ggc	ccc	gcc	cag	gcc	tca	ctg	ccc	tcc	tcg	tcc	ttc	aga	tcc	aga	4782
Thr	Gly	Pro	Ala	Gln	Ala	Ser	Leu	Pro	Ser	Ser	Ser	Phe	Arg	Ser	Arg	
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Gln	Asn	Val	Lys	Phe	Ala	Ala	Ser	Val	Lys	Ser	Lys	Lys	Ala	Ser	Ser	
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Ile Leu Lys Gly Lys Lys Phe Gly Pro Phe Val Gly Asp Lys Lys Lys
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Lys Glu Glu Asp Glu Arg Pro Leu Ala Ser Ala Pro Glu Gln Pro Ala
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Pro	Ile	Ala	Pro	Gly	Glu	Glu	Leu	Leu	Val	Trp	Tyr	Asn	Gly	Glu	Asp		
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Thr Val Asn His Ala Phe Lys Cys	Lys Tyr Cys Gly Lys Ala Phe Gly		
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Asn Met Arg Arg His Gln Arg Arg	Val His Glu Arg His Leu Ile Pro		
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Ala Asp Leu Tyr Gly Ile Asn Cys Leu Leu Thr Pro Val Thr Val Glu	
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att act caa aat ata aag acc aca cag gtc cct gta aca gaa gat ctt	1992
Ile Thr Gln Asn Ile Lys Thr Thr Gln Val Pro Val Thr Glu Asp Leu	
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cct aaa gag cct ttg ggc agc aca aat agt gag gcc aag aag cgg aga	2040
Pro Lys Glu Pro Leu Gly Ser Thr Asn Ser Glu Ala Lys Lys Arg Arg	
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act gcg agc cca cct gca ctg ccc aaa att aag gcc gaa aca gac tct	2088
Thr Ala Ser Pro Pro Ala Leu Pro Lys Ile Lys Ala Glu Thr Asp Ser	
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Asp Pro Met Val Pro Ser Cys Ser Leu Ser Leu Pro Leu Ser Ile Ser	
660 665 670	
aca aca gag gca gtg tct ttc cac aaa gag aaa agt gtt tat ttg tca	2184
Thr Thr Glu Ala Val Ser Phe His Lys Glu Lys Ser Val Tyr Leu Ser	
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tca aag ctc aaa caa ctt ctt caa acc caa gat aaa cta act cct cct	2232
Ser Lys Leu Lys Gln Leu Leu Gln Thr Gln Asp Lys Leu Thr Pro Pro	
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gca ggg att tca gca act gaa ata gct aaa tta ggt cct gtt tgt gtg	2280
Ala Gly Ile Ser Ala Thr Glu Ile Ala Lys Leu Gly Pro Val Cys Val	
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Ser Ala Pro Ala Ser Met Leu Pro Val Thr Ser Ser Arg Phe Lys Arg	
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cgg acc agc tct cct ccc agt tct cca cag cac agt cct gcc ctt cga	2376
Arg Thr Ser Ser Pro Pro Ser Ser Pro Gln His Ser Pro Ala Leu Arg	
740 745 750	

gac ttt gga aag cca agt gat ggg aaa gca gca tgg acc gat gcc ggg	2424
Asp Phe Gly Lys Pro Ser Asp Gly Lys Ala Ala Trp Thr Asp Ala Gly	
755 760 765	
ctg act tcc aaa aaa tcc aaa tta gaa agt cac agc gac tca cca gca	2472
Leu Thr Ser Lys Lys Ser Lys Leu Glu Ser His Ser Asp Ser Pro Ala	
770 775 780	
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Trp Ser Leu Ser Gly Arg Asp Glu Arg Glu Thr Val Ser Pro Pro Cys	
785 790 795 800	
ttt gat gaa tat aaa atg tct aaa gag tgg aca gct agt tct gct ttt	2568
Phe Asp Glu Tyr Lys Met Ser Lys Glu Trp Thr Ala Ser Ser Ala Phe	
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agc agt gtg tgc aac cag cag cca ctg gat tta tcc agc ggt gtc aaa	2616
Ser Ser Val Cys Asn Gln Gln Pro Leu Asp Leu Ser Ser Gly Val Lys	
820 825 830	
cag aag gct gag ggt aca ggc aag act cca gtc cag tgg gaa tct gtc	2664
Gln Lys Ala Glu Gly Thr Gly Lys Thr Pro Val Gln Trp Glu Ser Val	
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tta gat ctc agt gtg cat aaa aag cat tgt agt gac tct gaa ggc aag	2712
Leu Asp Leu Ser Val His Lys Lys His Cys Ser Asp Ser Glu Gly Lys	
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gaa ttc aaa gaa agt cat tca gtg cag cct acg tgt agt gct gta aag	2760
Glu Phe Lys Glu Ser His Ser Val Gln Pro Thr Cys Ser Ala Val Lys	
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Lys Arg Lys Pro Thr Thr Cys Met Leu Gln Lys Val Leu Leu Asn Glu	
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Tyr Asn Gly Ile Asp Leu Pro Val Glu Asn Pro Ala Asp Gly Thr Arg	
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Ser Pro Ser Pro Cys Lys Ser Leu Glu Ala Gln Pro Asp Pro Asp Leu	
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Gly Pro Gly Ser Gly Phe Pro Ala Pro Thr Val Glu Ser Thr Pro Asp	
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Val Cys Pro Ser Ser Pro Ala Leu Gln Thr Pro Ser Leu Ser Ser Gly	
945 950 955 960	
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Gln	Leu	Pro	Pro	Leu	Leu	Ile	Pro	Thr	Asp	Pro	Ser	Ser	Pro	Pro	Pro		
				965					970					975			
tgt	ccc	ccg	gta	tta	act	gtt	gcc	act	ccg	ccc	cct	ccc	ctc	ctt	cct	3096	
Cys	Pro	Pro	Val	Leu	Thr	Val	Ala	Thr	Pro	Pro	Pro	Pro	Leu	Leu	Pro		
			980					985					990				
acc	gta	cct	ctt	cca	gcc	ccc	tct	tcc	agt	gca	tct	cca	cac	cca	tgc	3144	
Thr	Val	Pro	Leu	Pro	Ala	Pro	Ser	Ser	Ser	Ala	Ser	Pro	His	Pro	Cys		
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ccc	tct	cca	ctc	tca	aat	gcc	acc	gca	cag	tcc	cca	ctt	cca	att	ctg	3192	
Pro	Ser	Pro	Leu	Ser	Asn	Ala	Thr	Ala	Gln	Ser	Pro	Leu	Pro	Ile	Leu		
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Ser	Pro	Thr	Val	Ser	Pro	Ser	Pro	Ser	Pro	Ile	Pro	Pro	Val	Glu	Pro		
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Leu	Met	Ser	Ala	Ala	Ser	Pro	Gly	Pro	Pro	Thr	Leu	Ser	Ser	Ser	Ser		
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tct	tca	tct	tcc	tcc	tcc	tct	tcc	ttt	tct	tct	tca	tct	tcc	tcc	tct	3336	
Ser	Ser	Ser	Ser	Ser	Ser	Ser	Ser	Phe	Ser	Ser	Ser	Ser	Ser	Ser	Ser		
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tct	cct	tct	cca	cct	cct	ctc	tcc	gca	ata	tca	tct	gtt	gtt	tcc	tct	3384	
Ser	Pro	Ser	Pro	Pro	Pro	Leu	Ser	Ala	Ile	Ser	Ser	Val	Val	Ser	Ser		
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ggt	gat	aat	ctg	gag	gct	tct	ctc	ccc	atg	ata	tct	ttc	aaa	cag	gag	3432	
Gly	Asp	Asn	Leu	Glu	Ala	Ser	Leu	Pro	Met	Ile	Ser	Phe	Lys	Gln	Glu		
	1090					1095					1100						
gaa	tta	gag	aat	gaa	ggt	ctg	aaa	ccc	agg	gaa	gag	ccc	cag	tct	gct	3480	
Glu	Leu	Glu	Asn	Glu	Gly	Leu	Lys	Pro	Arg	Glu	Glu	Pro	Gln	Ser	Ala		
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gct	gaa	cag	gat	gtt	gtt	gtt	cag	gaa	aca	ttc	aac	aaa	aac	ttt	gtt	3528	
Ala	Glu	Gln	Asp	Val	Val	Val	Gln	Glu	Thr	Phe	Asn	Lys	Asn	Phe	Val		
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Cys	Asn	Val	Cys	Glu	Ser	Pro	Phe	Leu	Ser	Ile	Lys	Asp	Leu	Thr	Lys		
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His	Leu	Ser	Ile	His	Ala	Glu	Glu	Trp	Pro	Phe	Lys	Cys	Glu	Phe	Cys		
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Leu His Gly Val Gly Asn Ile Phe Val Cys Ser Val Cys Lys Lys Glu			
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Phe Ala Phe Leu Cys Asn Leu Gln Gln His Gln Arg Asp Leu His Pro			
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gat aag gtg tgc aca cat cac gag ttt gaa agc ggg act ctg agg ccc			3816
Asp Lys Val Cys Thr His His Glu Phe Glu Ser Gly Thr Leu Arg Pro			
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Gln Asn Phe Thr Asp Pro Ser Lys Ala His Val Glu His Met Gln Ser			
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Leu Pro Glu Asp Pro Leu Glu Thr Ser Lys Glu Glu Glu Glu Leu Asn			
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gat tcc tct gaa gag ctt tac acg act ata aaa ata atg gct tct gga			3960
Asp Ser Ser Glu Glu Leu Tyr Thr Thr Ile Lys Ile Met Ala Ser Gly			
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ata aag aca aaa gat cca gat gtt cga ttg ggc ctc aat cag cat tac			4008
Ile Lys Thr Lys Asp Pro Asp Val Arg Leu Gly Leu Asn Gln His Tyr			
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cca agc ttt aaa cca cct cca ttt cag tac cat cac cgt aac ccc atg			4056
Pro Ser Phe Lys Pro Pro Pro Phe Gln Tyr His His Arg Asn Pro Met			
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ggg att ggt gtg aca gcc aca aat ttc act aca cac aat att cca cag			4104
Gly Ile Gly Val Thr Ala Thr Asn Phe Thr Thr His Asn Ile Pro Gln			
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act ttc act acc gcc att cgc tgc aca aag tgt gga aaa ggt gtc gac			4152
Thr Phe Thr Thr Ala Ile Arg Cys Thr Lys Cys Gly Lys Gly Val Asp			
	1330	1335	1340
aat atg ccg gag ttg cac aaa cat atc ctg gct tgt gct tct gca agt			4200
Asn Met Pro Glu Leu His Lys His Ile Leu Ala Cys Ala Ser Ala Ser			
1345	1350	1355	1360
gac aag aag agg tac acg cct aag aaa aac cca gta cca tta aaa caa			4248
Asp Lys Lys Arg Tyr Thr Pro Lys Lys Asn Pro Val Pro Leu Lys Gln			
	1365	1370	1375
act gtg caa ccc aaa aat ggc gtg gtg gtt tta gat aac tct ggg aaa			4296
Thr Val Gln Pro Lys Asn Gly Val Val Val Leu Asp Asn Ser Gly Lys			
	1380	1385	1390

aat gcc ttc cga cga atg gga cag ccc aaa agg ctt aac ttt agt gtt	4344
Asn Ala Phe Arg Arg Met Gly Gln Pro Lys Arg Leu Asn Phe Ser Val	
1395 1400 1405	
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Glu Leu Ser Lys Met Ser Ser Asn Lys Leu Lys Leu Asn Ala Leu Lys	
1410 1415 1420	
aaa aaa aat cag cta gta cag aaa gca att ctt cag aaa aac aaa tct	4440
Lys Lys Asn Gln Leu Val Gln Lys Ala Ile Leu Gln Lys Asn Lys Ser	
1425 1430 1435 1440	
gca aag cag aag gcc gac ttg aaa aat gct tgt gag tca tcc tct cac	4488
Ala Lys Gln Lys Ala Asp Leu Lys Asn Ala Cys Glu Ser Ser Ser His	
1445 1450 1455	
atc tgc cct tac tgt aat cga gag ttc act tac att gga agc ctg aat	4536
Ile Cys Pro Tyr Cys Asn Arg Glu Phe Thr Tyr Ile Gly Ser Leu Asn	
1460 1465 1470	
aaa cac gcc gcc ttc agc tgt ccc aaa aaa ccc ctt tct cct ccc aaa	4584
Lys His Ala Ala Phe Ser Cys Pro Lys Lys Pro Leu Ser Pro Pro Lys	
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Lys Lys Val Ser His Ser Ser Lys Lys Gly Gly His Ser Ser Pro Ala	
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Ser Ser Asp Lys Asn Ser Asn Ser Asn His Arg Arg Arg Thr Ala Asp	
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Ala Arg Ser Ser Gly Pro Thr Gln Val Pro Leu Pro Ser Ser Ser Phe	
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agg tcc aag cag aac gtc aag ttt gca gct tcg gtg aaa tcc aaa aaa	4824
Arg Ser Lys Gln Asn Val Lys Phe Ala Ala Ser Val Lys Ser Lys Lys	
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cca agc tcc tcc tct tta agg aac tcc agc ccg ata aga atg gcc aaa	4872
Pro Ser Ser Ser Ser Leu Arg Asn Ser Ser Pro Ile Arg Met Ala Lys	
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Ser Ala Gln Leu Ser Ser Lys Thr Ser Arg Ser Leu His Val Arg Val
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Gln Lys Ser Lys Ala Val Leu Gln Ser Lys Ser Thr Leu Ala Ser Lys
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Lys Arg Thr Asp Arg Phe Asn Ile Lys Ser Arg Glu Arg Ser Gly Gly
1635 1640 1645

cca gtc acc cgg agc ctt cag ctg gca gct gct gct gac ttg agt gag 5112
Pro Val Thr Arg Ser Leu Gln Leu Ala Ala Ala Asp Leu Ser Glu
1650 1655 1660

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Asn Lys Arg Glu Asp Gly Ser Ala Lys Gln Glu Leu Lys Asp Phe Ser
1665 1670 1675 1680

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Tyr Ser Leu Arg Leu Ala Ser Arg Cys Ser Pro Pro Ala Ala Ser Tyr
1685 1690 1695

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Ile Thr Arg Gln Tyr Arg Lys Val Lys Ala Pro Ala Ala Gln Phe
1700 1705 1710

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Gln Gly Pro Phe Phe Lys Glu
1715

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Glu Val Pro Glu His Val Leu Arg Gly Leu Pro Glu Glu Val Arg Leu
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Phe	Pro	Ser	Ala	Val	Asp	Lys	Thr	Arg	Ile	Gly	Val	Trp	Ala	Thr	Lys
		35					40					45			
Pro	Ile	Leu	Lys	Gly	Lys	Lys	Phe	Gly	Pro	Phe	Val	Gly	Asp	Lys	Lys
	50					55					60				
Lys	Arg	Ser	Gln	Val	Lys	Asn	Asn	Val	Tyr	Met	Trp	Glu	Val	Tyr	Tyr
65					70					75					80
Pro	Asn	Leu	Gly	Trp	Met	Cys	Ile	Asp	Ala	Thr	Asp	Pro	Glu	Lys	Gly
			85						90					95	
Asn	Trp	Leu	Arg	Tyr	Val	Asn	Trp	Ala	Cys	Ser	Gly	Glu	Glu	Gln	Asn
		100						105						110	
Leu	Phe	Pro	Leu	Glu	Ile	Asn	Arg	Ala	Ile	Tyr	Tyr	Lys	Thr	Leu	Lys
	115						120					125			
Pro	Ile	Ala	Pro	Gly	Glu	Glu	Leu	Leu	Val	Trp	Tyr	Asn	Gly	Glu	Asp
	130					135					140				
Asn	Pro	Glu	Ile	Ala	Ala	Ala	Ile	Glu	Glu	Glu	Arg	Ala	Ser	Ala	Arg
145					150					155					160
Ser	Lys	Arg	Ser	Ser	Pro	Lys	Ser	Arg	Lys	Gly	Lys	Lys	Lys	Ser	Gln
			165						170					175	
Glu	Asn	Lys	Asn	Lys	Gly	Asn	Lys	Ile	Gln	Asp	Ile	Gln	Leu	Lys	Thr
		180						185					190		
Ser	Glu	Pro	Asp	Phe	Thr	Ser	Ala	Asn	Met	Arg	Asp	Ser	Ala	Glu	Gly
	195						200					205			
Pro	Lys	Glu	Asp	Glu	Glu	Lys	Pro	Ser	Ala	Ser	Ala	Leu	Glu	Gln	Pro
	210					215					220				
Ala	Thr	Leu	Gln	Glu	Val	Ala	Ser	Gln	Glu	Val	Pro	Pro	Glu	Leu	Ala
225					230					235					240
Thr	Pro	Ala	Pro	Ala	Trp	Glu	Pro	Gln	Pro	Glu	Pro	Asp	Glu	Arg	Leu
			245						250					255	
Glu	Ala	Ala	Ala	Cys	Glu	Val	Asn	Asp	Leu	Gly	Glu	Glu	Glu	Glu	Glu
		260					265					270			
Glu	Glu	Glu	Glu	Asp	Glu	Glu	Glu	Glu	Asp	Asp	Asp	Asp	Asp	Asp	Glu
	275					280				285					
Leu	Glu	Asp	Glu	Gly	Glu	Glu	Glu	Ala	Ser	Met	Pro	Asn	Glu	Asn	Ser
	290					295				300					
Val	Lys	Glu	Pro	Glu	Ile	Arg	Cys	Asp	Glu	Lys	Pro	Glu	Asp	Leu	Leu
305					310					315					320
Glu	Glu	Pro	Lys	Thr	Thr	Ser	Glu	Glu	Thr	Leu	Glu	Asp	Cys	Ser	Glu
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Val	Thr	Pro	Ala	Met	Gln	Ile	Pro	Arg	Thr	Lys	Glu	Glu	Ala	Asn	Gly
		340						345					350		
Asp	Val	Phe	Glu	Thr	Phe	Met	Phe	Pro	Cys	Gln	His	Cys	Glu	Arg	Lys
	355						360					365			
Phe	Thr	Thr	Lys	Gln	Gly	Leu	Glu	Arg	His	Met	His	Ile	His	Ile	Ser
	370					375					380				
Thr	Val	Asn	His	Ala	Phe	Lys	Cys	Lys	Tyr	Cys	Gly	Lys	Ala	Phe	Gly
385					390					395					400
Thr	Gln	Ile	Asn	Arg	Arg	Arg	His	Glu	Arg	Arg	His	Glu	Ala	Gly	Leu
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Lys	Arg	Lys	Pro	Ser	Gln	Thr	Leu	Gln	Pro	Ser	Glu	Asp	Leu	Ala	Asp
		420						425				430			
Gly	Lys	Ala	Ser	Gly	Glu	Asn	Val	Ala	Ser	Lys	Asp	Asp	Ser	Ser	Pro
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Pro	Ser	Leu	Gly	Pro	Asp	Cys	Leu	Ile	Met	Asn	Ser	Glu	Lys	Ala	Ser

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Gln Asp Thr Ile Asn Ser Val Val Glu Glu Asn Gly Glu Val Lys				
465		470		480
Glu Leu His Pro Cys Lys Tyr Cys Lys Lys Val Phe Gly Thr His Thr				
	485		490	495
Asn Met Arg Arg His Gln Arg Arg Val His Glu Arg His Leu Ile Pro				
	500		505	510
Lys Gly Val Arg Arg Lys Gly Gly Leu Glu Glu Pro Gln Pro Pro Ala				
	515		520	525
Glu Gln Ala Gln Ala Thr Gln Asn Val Tyr Val Pro Ser Thr Glu Pro				
	530		535	540
Glu Glu Glu Gly Glu Ala Asp Asp Val Tyr Ile Met Asp Ile Ser Ser				
545		550		560
Asn Ile Ser Glu Asn Leu Asn Tyr Tyr Ile Asp Gly Lys Ile Gln Thr				
	565		570	575
Asn Asn Asn Thr Ser Asn Cys Asp Val Ile Glu Met Glu Ser Ala Ser				
	580		585	590
Ala Asp Leu Tyr Gly Ile Asn Cys Leu Leu Thr Pro Val Thr Val Glu				
	595		600	605
Ile Thr Gln Asn Ile Lys Thr Thr Gln Val Pro Val Thr Glu Asp Leu				
610		615		620
Pro Lys Glu Pro Leu Gly Ser Thr Asn Ser Glu Ala Lys Lys Arg Arg				
625		630		640
Thr Ala Ser Pro Pro Ala Leu Pro Lys Ile Lys Ala Glu Thr Asp Ser				
	645		650	655
Asp Pro Met Val Pro Ser Cys Ser Leu Ser Leu Pro Leu Ser Ile Ser				
	660		665	670
Thr Thr Glu Ala Val Ser Phe His Lys Glu Lys Ser Val Tyr Leu Ser				
	675		680	685
Ser Lys Leu Lys Gln Leu Leu Gln Thr Gln Asp Lys Leu Thr Pro Pro				
690		695		700
Ala Gly Ile Ser Ala Thr Glu Ile Ala Lys Leu Gly Pro Val Cys Val				
705		710		720
Ser Ala Pro Ala Ser Met Leu Pro Val Thr Ser Ser Arg Phe Lys Arg				
	725		730	735
Arg Thr Ser Ser Pro Pro Ser Ser Pro Gln His Ser Pro Ala Leu Arg				
	740		745	750
Asp Phe Gly Lys Pro Ser Asp Gly Lys Ala Ala Trp Thr Asp Ala Gly				
	755		760	765
Leu Thr Ser Lys Lys Ser Lys Leu Glu Ser His Ser Asp Ser Pro Ala				
770		775		780
Trp Ser Leu Ser Gly Arg Asp Glu Arg Glu Thr Val Ser Pro Pro Cys				
785		790		800
Phe Asp Glu Tyr Lys Met Ser Lys Glu Trp Thr Ala Ser Ser Ala Phe				
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Ser Ser Val Cys Asn Gln Gln Pro Leu Asp Leu Ser Ser Gly Val Lys				
	820		825	830
Gln Lys Ala Glu Gly Thr Gly Lys Thr Pro Val Gln Trp Glu Ser Val				
	835		840	845
Leu Asp Leu Ser Val His Lys Lys His Cys Ser Asp Ser Glu Gly Lys				
	850		855	860
Glu Phe Lys Glu Ser His Ser Val Gln Pro Thr Cys Ser Ala Val Lys				
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Lys	Arg	Lys	Pro	Thr	Thr	Cys	Met	Leu	Gln	Lys	Val	Leu	Leu	Asn	Glu	885	890	895
Tyr	Asn	Gly	Ile	Asp	Leu	Pro	Val	Glu	Asn	Pro	Ala	Asp	Gly	Thr	Arg	900	905	910
Ser	Pro	Ser	Pro	Cys	Lys	Ser	Leu	Glu	Ala	Gln	Pro	Asp	Pro	Asp	Leu	915	920	925
Gly	Pro	Gly	Ser	Gly	Phe	Pro	Ala	Pro	Thr	Val	Glu	Ser	Thr	Pro	Asp	930	935	940
Val	Cys	Pro	Ser	Ser	Pro	Ala	Leu	Gln	Thr	Pro	Ser	Leu	Ser	Ser	Gly	945	950	955
Gln	Leu	Pro	Pro	Leu	Leu	Ile	Pro	Thr	Asp	Pro	Ser	Ser	Pro	Pro	Pro	965	970	975
Cys	Pro	Pro	Val	Leu	Thr	Val	Ala	Thr	Pro	Pro	Pro	Pro	Leu	Leu	Pro	980	985	990
Thr	Val	Pro	Leu	Pro	Ala	Pro	Ser	Ser	Ser	Ala	Ser	Pro	His	Pro	Cys	995	1000	1005
Pro	Ser	Pro	Leu	Ser	Asn	Ala	Thr	Ala	Gln	Ser	Pro	Leu	Pro	Ile	Leu	1010	1015	1020
Ser	Pro	Thr	Val	Ser	Pro	Ser	Pro	Ser	Pro	Ile	Pro	Pro	Val	Glu	Pro	1025	1030	1035
Leu	Met	Ser	Ala	Ala	Ser	Pro	Gly	Pro	Pro	Thr	Leu	Ser	Ser	Ser	Ser	1045	1050	1055
Ser	Ser	Ser	Ser	Ser	Ser	Ser	Ser	Phe	Ser	Ser	Ser	Ser	Ser	Ser	Ser	1060	1065	1070
Ser	Pro	Ser	Pro	Pro	Pro	Leu	Ser	Ala	Ile	Ser	Ser	Val	Val	Ser	Ser	1075	1080	1085
Gly	Asp	Asn	Leu	Glu	Ala	Ser	Leu	Pro	Met	Ile	Ser	Phe	Lys	Gln	Glu	1090	1095	1100
Glu	Leu	Glu	Asn	Glu	Gly	Leu	Lys	Pro	Arg	Glu	Glu	Pro	Gln	Ser	Ala	1105	1110	1115
Ala	Glu	Gln	Asp	Val	Val	Val	Gln	Glu	Thr	Phe	Asn	Lys	Asn	Phe	Val	1125	1130	1135
Cys	Asn	Val	Cys	Glu	Ser	Pro	Phe	Leu	Ser	Ile	Lys	Asp	Leu	Thr	Lys	1140	1145	1150
His	Leu	Ser	Ile	His	Ala	Glu	Glu	Trp	Pro	Phe	Lys	Cys	Glu	Phe	Cys	1155	1160	1165
Val	Gln	Leu	Phe	Lys	Asp	Lys	Thr	Asp	Leu	Ser	Glu	His	Arg	Phe	Leu	1170	1175	1180
Leu	His	Gly	Val	Gly	Asn	Ile	Phe	Val	Cys	Ser	Val	Cys	Lys	Lys	Glu	1185	1190	1195
Phe	Ala	Phe	Leu	Cys	Asn	Leu	Gln	Gln	His	Gln	Arg	Asp	Leu	His	Pro	1205	1210	1215
Asp	Lys	Val	Cys	Thr	His	His	Glu	Phe	Glu	Ser	Gly	Thr	Leu	Arg	Pro	1220	1225	1230
Gln	Asn	Phe	Thr	Asp	Pro	Ser	Lys	Ala	His	Val	Glu	His	Met	Gln	Ser	1235	1240	1245
Leu	Pro	Glu	Asp	Pro	Leu	Glu	Thr	Ser	Lys	Glu	Glu	Glu	Glu	Leu	Asn	1250	1255	1260
Asp	Ser	Ser	Glu	Glu	Leu	Tyr	Thr	Thr	Ile	Lys	Ile	Met	Ala	Ser	Gly	1265	1270	1275
Ile	Lys	Thr	Lys	Asp	Pro	Asp	Val	Arg	Leu	Gly	Leu	Asn	Gln	His	Tyr	1285	1290	1295
Pro	Ser	Phe	Lys	Pro	Pro	Pro	Phe	Gln	Tyr	His	His	Arg	Asn	Pro	Met			

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Gly	Ile	Gly	Val	Thr	Ala	Thr	Asn	Phe	Thr	Thr	His	Asn	Ile	Pro	Gln
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Asn	Met	Pro	Glu	Leu	His	Lys	His	Ile	Leu	Ala	Cys	Ala	Ser	Ala	Ser
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Asp	Lys	Lys	Arg	Tyr	Thr	Pro	Lys	Lys	Asn	Pro	Val	Pro	Leu	Lys	Gln
1365					1370					1375					
Thr	Val	Gln	Pro	Lys	Asn	Gly	Val	Val	Val	Leu	Asp	Asn	Ser	Gly	Lys
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Asn	Ala	Phe	Arg	Arg	Met	Gly	Gln	Pro	Lys	Arg	Leu	Asn	Phe	Ser	Val
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Glu	Leu	Ser	Lys	Met	Ser	Ser	Asn	Lys	Leu	Lys	Leu	Asn	Ala	Leu	Lys
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Lys	Lys	Asn	Gln	Leu	Val	Gln	Lys	Ala	Ile	Leu	Gln	Lys	Asn	Lys	Ser
1425					1430					1435					1440
Ala	Lys	Gln	Lys	Ala	Asp	Leu	Lys	Asn	Ala	Cys	Glu	Ser	Ser	Ser	His
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Ile	Cys	Pro	Tyr	Cys	Asn	Arg	Glu	Phe	Thr	Tyr	Ile	Gly	Ser	Leu	Asn
1460					1465					1470					
Lys	His	Ala	Ala	Phe	Ser	Cys	Pro	Lys	Lys	Pro	Leu	Ser	Pro	Pro	Lys
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Lys	Lys	Val	Ser	His	Ser	Ser	Lys	Lys	Gly	Gly	His	Ser	Ser	Pro	Ala
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Ser	Ser	Asp	Lys	Asn	Ser	Asn	Ser	Asn	His	Arg	Arg	Thr	Ala	Asp	
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Ala	Glu	Ile	Lys	Met	Gln	Ser	Met	Gln	Thr	Pro	Leu	Gly	Lys	Thr	Arg
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gag	aag	ggc	aac	tgg	ctc	cgc	tat	gtg	aac	tgg	gct	tgc	tca	gga	gaa	96
Glu	Lys	Gly	Asn	Trp	Leu	Arg	Tyr	Val	Asn	Trp	Ala	Cys	Ser	Gly	Glu	
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gaa	cag	aat	tta	ttt	cca	ctg	gaa	atc	aac	aga	gcc	att	tac	tat	aaa	144
Glu	Gln	Asn	Leu	Phe	Pro	Leu	Glu	Ile	Asn	Arg	Ala	Ile	Tyr	Tyr	Lys	
		35					40					45				

acc	tta	aag	cca	atc	gcg	cct	ggc	gag	gag	ctc	ctg	gtc	tgg	tac	aat	192
Thr	Leu	Lys	Pro	Ile	Ala	Pro	Gly	Glu	Glu	Leu	Leu	Val	Trp	Tyr	Asn	
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Gly	Glu	Asp	Asn	Pro	Glu	Ile	Ala	Ala	Ala	Ile	Glu	Glu	Glu	Arg	Ala	
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agc	gcc	cgg	agc	aag	cgg	agc	tcc	ccg	aag	agc	cgg	aga	ggg	aag	aag	288
Ser	Ala	Arg	Ser	Lys	Arg	Ser	Ser	Pro	Lys	Ser	Arg	Arg	Gly	Lys	Lys	
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aaa	tca	cag	gag	aat	aaa	aac	aaa	ggc	atc	aga	acc	cag	gct	gca	gcg	336
Lys	Ser	Gln	Glu	Asn	Lys	Asn	Lys	Gly	Ile	Arg	Thr	Gln	Ala	Ala	Ala	
			100					105					110			

cgg	aag	gcg	agc	gag	ctg	gac	tcc	acc	tct	gca	aac	atg	agg	ggc	tct	384
Arg	Lys	Ala	Ser	Glu	Leu	Asp	Ser	Thr	Ser	Ala	Asn	Met	Arg	Gly	Ser	
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	50		55		60										
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